

USR-G780 User Manual

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Functions & Features

- Supports TDD-LTE(38,39,40,41), FDD-LTE(1,3), WCDMA(1,8), TD-SCDMA(34,39), GSM(3,8)
- Based on embedded Linux system, in high stability
- Support RNDIS Remote Network Driver Interface (USB interface)
- 4 Line network connections at same time (TCP and UDP)
- 10KB Serial data buffer each link prevent data-losing
- Identity package and Heartbeat package
- Support configuring the parameters via SMS
- Work mode: Transparent mode and HTTPD client mode
- Configured with AT Command Set
- Socket distribution protocol, can send data to different sockets
- upgrade firmware for your G780 with FTP
- Send message by AT Command
- Synchronous and adaptive Serial port baud rate

1. Overview

1.1. Brief Introduction

4G DTU USR-G780 is used to transmit data between serial port and network server by operator network. It is configured by AT Command and work in dual transparent transmission mode.

USR-G780 is used in LTE, WCDMA, TD-SCDMA. It works in transparent transmission mode and more functional software with high speed and less time delay, supports FTP protocol.

We add Watchdog timer (a automatic reboot trigger) to ensure the stability if work for a long time.

1.2. Default Parameter

Name	Parameter
Work Mode	Transparent Transmission Mode
Server Address	test.usr.cn
Server Port	2317
Serial Parameter	115200, 8, 1, None
Heartbeat Package	Enable; Heartbeat content: www.usr.cn

Figure 1

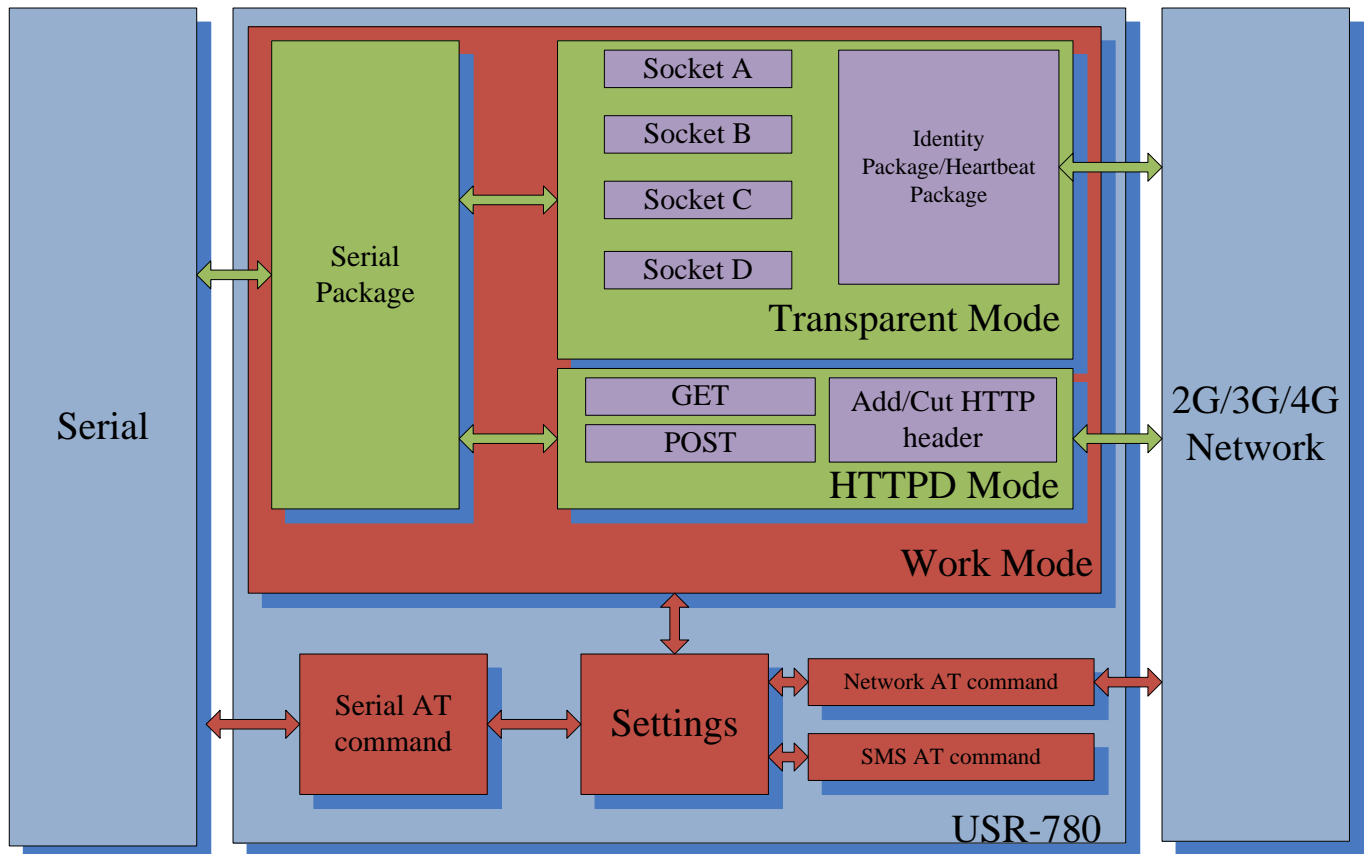
1.3. Basic parameter

	Parameter	Value	
Wireless parameters	Bands / Frequency	TDD-LTE	Band 38 / 39 / 40 / 41
		FDD-LTE	Band 1 / 3
		WCDMA	Band 1 / 8
		TD-SCDMA	Band 34 / 39
		GSM/GPRS/EDGE	Band 3 / 8
	Transmit power	TDD-LTE	+23dBm(Power class 3)
		FDD-LTE	+23dBm(Power class 3)
		WCDMA	+23dBm(Power class 3)
		TD-SCDMA	+24dBm(Power class 2)
		GSM Band 8	+33dBm(Power class 4)
		GSM Band 3	+30dBm(Power class 1)
	Specification	TDD-LTE	3GPP R9 CAT4 downlink 150 Mbps, uplink 50 Mbps
		FDD-LTE	3GPP R9 CAT4 downlink 150 Mbps, uplink 50 Mbps
		WCDMA	HSPA+ downlink 21 Mbps, uplink 5.76 Mbps
		TD-SCDMA	3GPP R9 downlink 2.8 Mbps uplink 2.2 Mbps
		GSM/GPRS/EDGE	MAX: downlink 384 kbps , uplink128 kbps
		Antenna	SMA Interface
Hardware Parameter	Interface	RS232/RS485: 300bps - 460800bps	
	Voltage	DC 5V~36V	
	Current	Ave: 55mA-100mA, Max: 138mA -12V	
	Operation temperature	-25℃ ~ 85℃	
	Storage temperature	-40℃ ~ 125℃	
	Size	103 × 83 × 28mm (L*W*H)	
Software Parameter	Work mode	Transparent mode, HTTPD mode, FTP mode	
	Set command	AT Command	
	Protocol	TCP/UDP/DNS/HTTP/FTP	
	Connection numbers	4	
	Configuration	Serial AT Command, Network AT Command, SMS AT Command	
	Software	Setup software	
Software	DNS	Support	

Function	Transparent mode	TCP Client / UDP Client
	Socket distribution protocol	
HTTP		Support
Heartbeat package		Support
Baud rate synchronization		Support
Identity package		User-defined/ ICCID/ IMEI for Identity package
USR Cloud		Support
Upgrade firmware for your MCU with FTP		Support

Figure 2

2. Function


Figure 3

2.1. Work Mode

2.1.1. Transparent Mode

Mode instruction

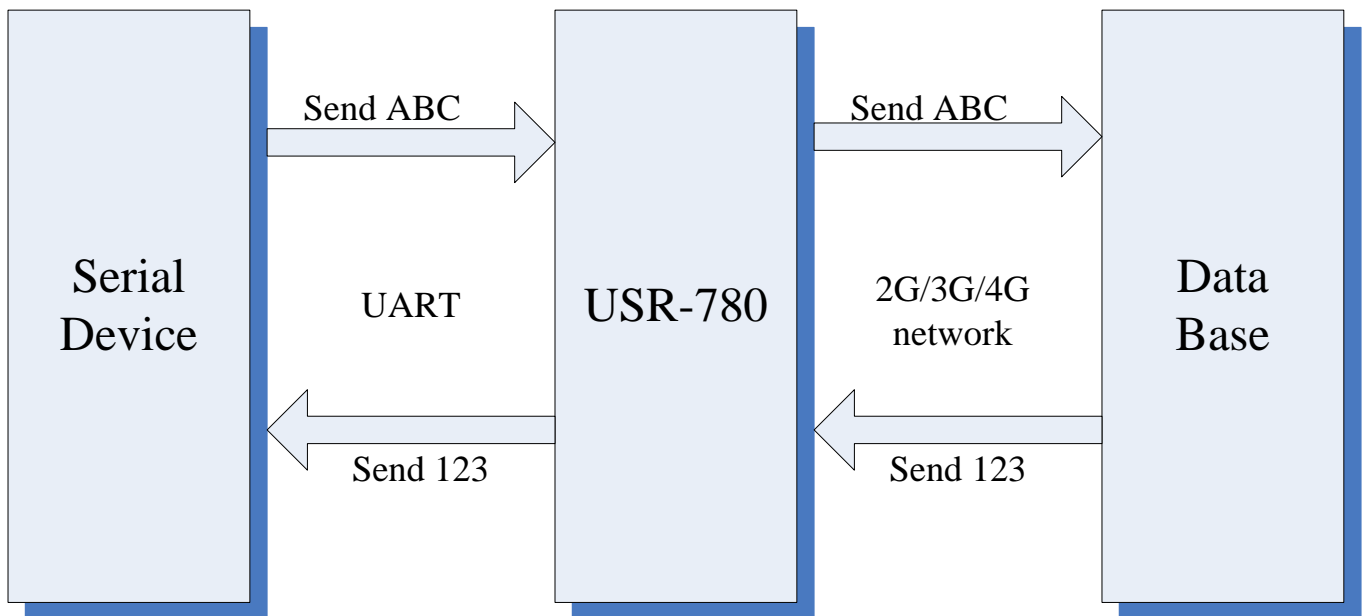
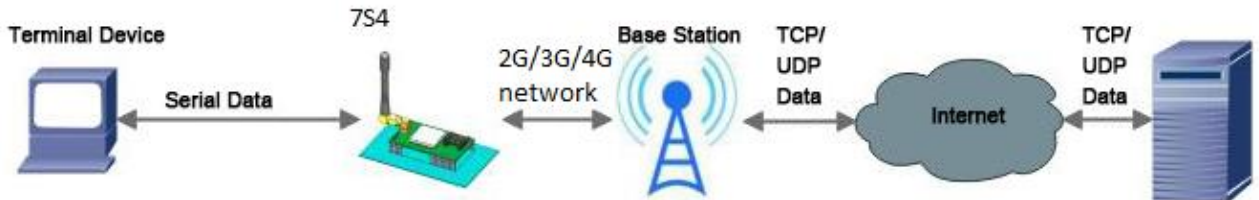


Figure 4

Transparent Mode: What you sent to serial will be forward to network. The communication is bidirectional. USR-G780 supports 4 socket connections simultaneously: socket A, socket B, socket C and socket D. they are independent. This DTU only support working as TCP Client and UDP Client. The TCP client can be persistence connection or not. If you don't use persistence connection, connection will break after your data transmitted.

2.1.2. HTTPD Client mode

Mode Instruction

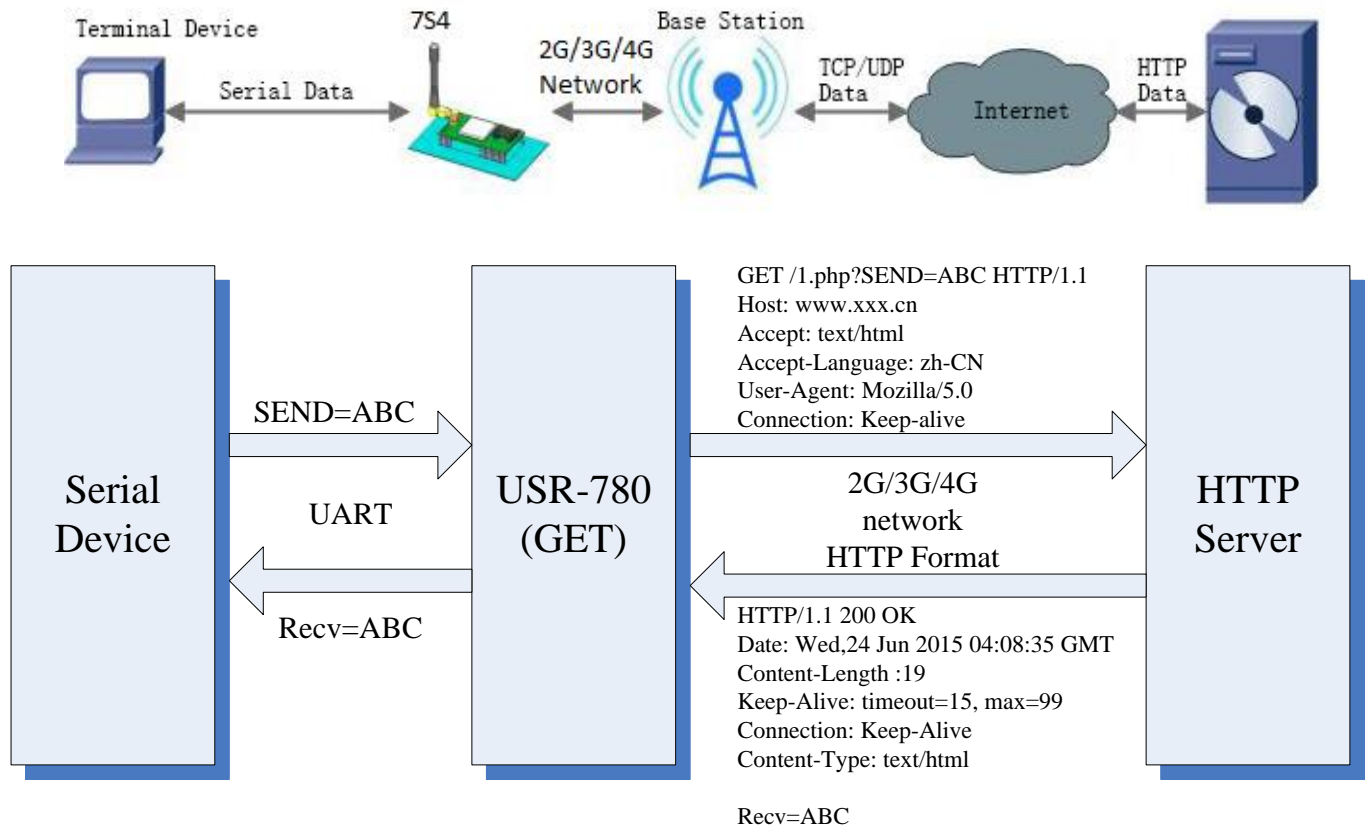


Figure 5

HTTPD Client Mode: USR-G780 will add the HTTP header for every data from serial and transfer HTTP format data to Network and cut the HTTP header before send network data to serial. User needs to configure the HTTP Header before use this mode. User can use this mode transfer the serial data to HTTP server.

2.2. Serial Port

2.2.1. Basic Parameter

Name	Parameter
Baud rate	300, 600,1200,2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800
Data bit	7,8
Stop bit	1,2
Parity	NONE, EVEN, ODD
*Flow control / 485 (under developing)	NFC:(no hardware flow control) 485:485 communication

Figure 6

2.2.2. Serial Package Methods

Due to network speed is faster than serial, module will put serial data in buffer before sending it to network. The data will be sent to Network as Package. There are 2 ways to end the package and send package to network - Time and Length.

2.2.3. Time triggered mechanism

If no data get from serial over the time threshold, it will end the package and send this package to network. The range of threshold is from 50ms ~ 60000ms. Default is 50ms. If the serial keeping send data, this package will be 1K bytes.

2.2.4. Length Trigger Mode

The package will be sent to network when it up to length threshold. The range of length threshold is from 1 to 1024 bytes. Default is 1024 bytes.

2.2.5. Baud rate synchronization

This function is similar to RFC2217. When module works with USR devices or software, serial parameter will change dynamically according to network protocol. Customer can modify serial parameter by sending data conformed to specific protocol via network. It is temporary, when restart DTU, the parameters back to original parameters.

2.3. Features

2.3.1. Registration package

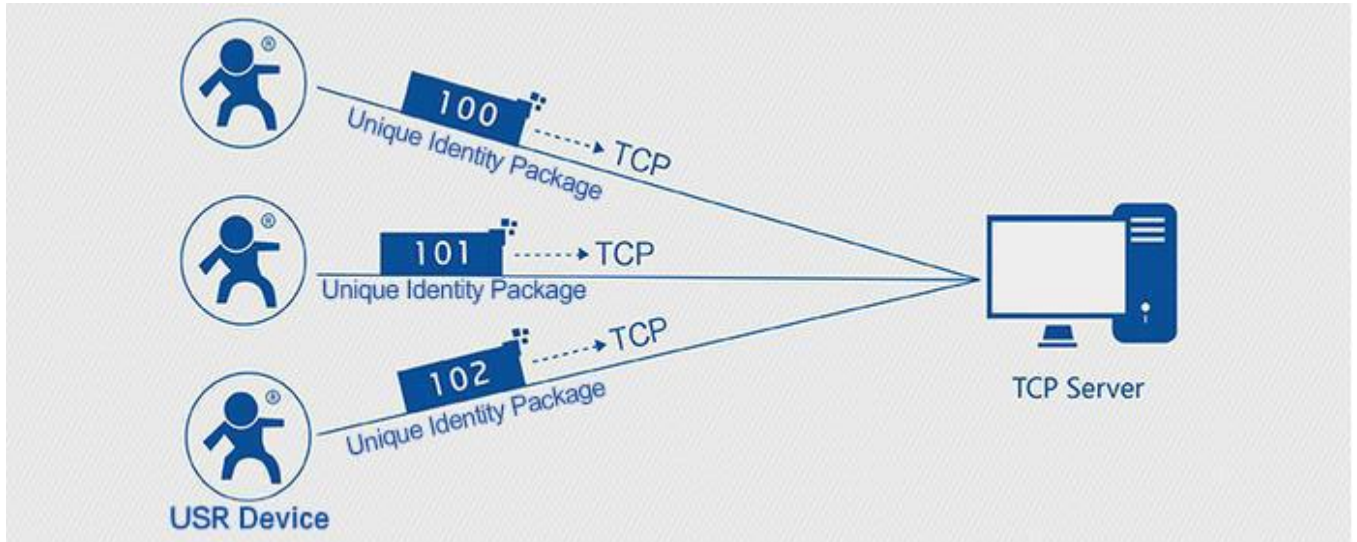


Figure 7

Identity Package is used for identify the device when module works as TCP client/UDP client. There are two methods for identity Package.

- Identity data will be sent when connection is established. (Only for TCP client)
- Identity data will be add on the front of every data package. (TCP client and UDP client)

Type of identity data: ICCID, IMEI, CLOUD and USER.

- ICCID, the unique identifier of SIM card, suitable to the application based on SIM card identification.
- IMEI, the unique identifier of USR-7S4, suitable to the application based on device identification.
- CLOUD, the identification code based on USR CLOUD platform. For more information about USR Cloud, please go to cloud.usr.cn/en/
- USER, You can use your own identity data.

2.3.2. Heartbeat package

Heartbeat Package: Module will output heartbeat data to serial or network periodic. User can configure the heartbeat data and time interval. Serial heartbeat data can be used for polling Modbus data. Network heartbeat data can be used for showing connection status and keep the connection.

Heartbeat Package is only in transparent mode.

2.3.3. Socket distribution protocol

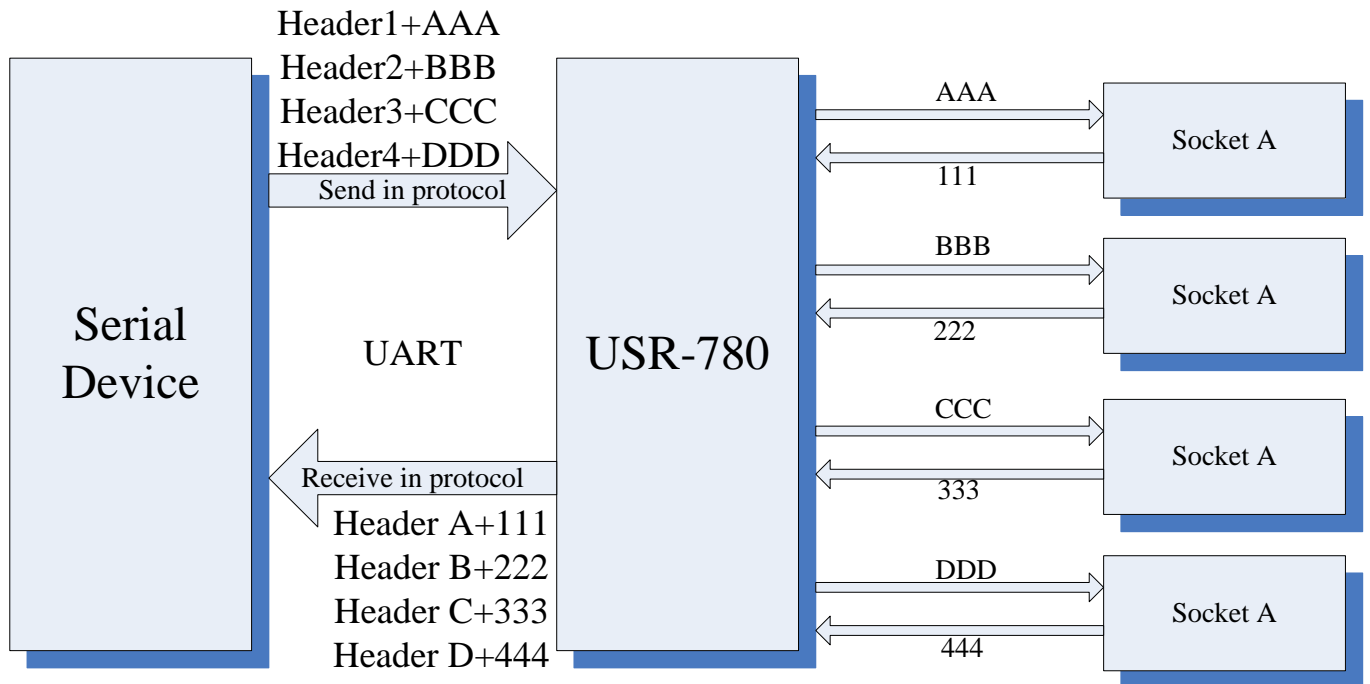


Figure 8

G780 has 2 UART and 4 sockets. If you don't use this protocol, your UART data will be sent to enabled sockets. And data from every socket will be sent to UART.

If you enable this protocol, UART data will be sent to appointed socket. And the data from different sockets will add different header before they are sent to UART.

2.3.4. RNDIS (Remote Network Driver Interface Specification)

Your device can access to network via 4G when you connect to USB interface of G780. We provide Windows, Linux and Android drivers.

2.3.5. Indicators

Indicator	Function	Status
PWR	Power light	On: Power on Off: Power off
WORK	Systems operation indicator light	On: working Off: Not working
NET	Network status indicator light	Off : No network Twice per second: 2G network Three times per second: 3G network Four times per second: 4G network
Link A	Socket A indicator light	On: Socket A connected Off: Socket B disconnected
Link B	Socket B indicator light	On: Socket B connected Off: Socket B disconnected

Figure 10

2.3.6. Hardware restore factory setting

Press Reload button for 3~15 seconds, USR-G780 will reload factory settings.

3. Parameter Setting

To configure module and querying status, there are 3 ways to use AT command. They are serial AT command, SMS AT command and transparent AT command. We provide the setup software based on serial AT command.

You can download the setup software in our website <http://www.usriot.com/usr-78x-setup-software/>

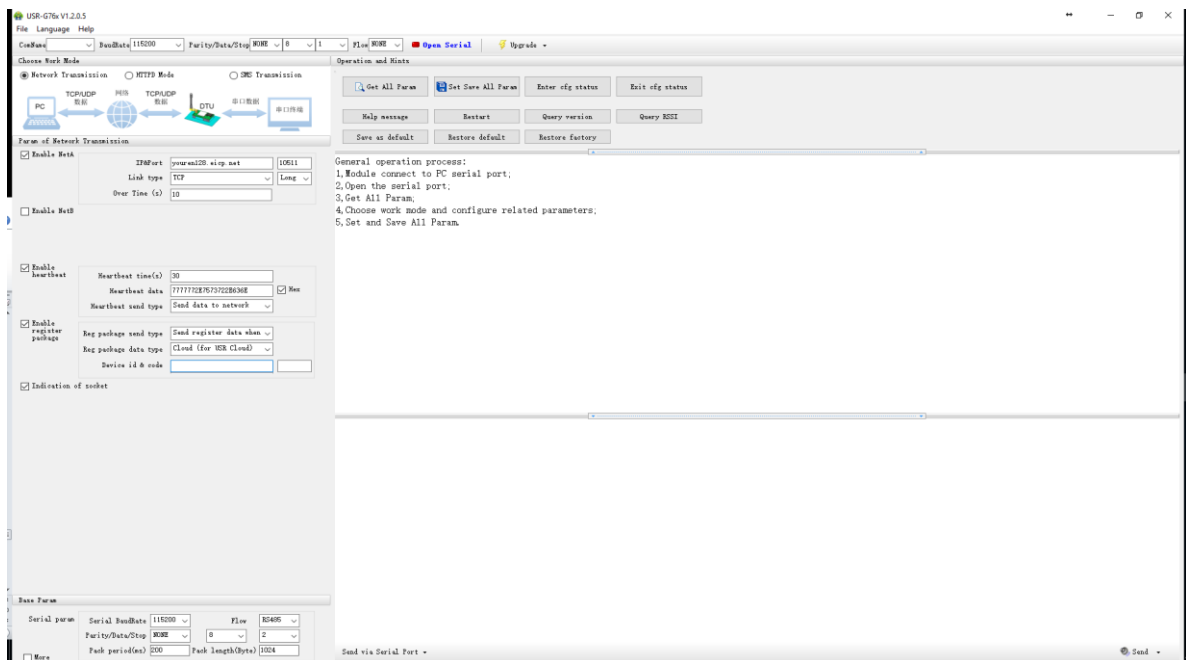


Figure 11

AT Command

3.1. Serial AT Command

In transparent mode, SMS mode and HTTPD mode, you can enter AT command mode. Then you can send AT command to module. Setup software is based on this function. For entering AT command mode, please refer to this FAQ: <http://www.usriot.com/enter-serial-command-mode/>.

3.2. Transparent AT Command

When module in transparent mode, you can use "Password,AT command" format to send AT command via serial or network. If you use transparent AT command, you needn't enter AT command mode.

3.3. SMS AT Command

You can configure module or query status by SMS AT command. It is for your remote control your module in fields.

4. Contact Us

Company: Jinan USR IOT Technology Limited

Address: Floor 11, Building 1, No. 1166 Xinluo Street, Gaoxin District, Jinan, Shandong, 250101, China

Web: www.usriot.com

Support: h.usriot.com

Email: sales@usr.cn

Tel: 86-531-88826739

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6. Updated History

2017-2-3 V1.0.4.1

First English version.